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WHAT IS CLAIMED IS:

1. An apparatus for transporting sample well trays with respect to a heating device, comprising:

a sample well tray holder comprising a plate in which a sample well tray may be positioned, said sample well tray holder configured to rotate about a first rotational axis;

a rotational actuator configured to rotate the sample well tray holder about the first rotational axis; and

a biasing mechanism configured to urge the sample well tray holder in a generally upward direction along the first rotational axis.

2. The apparatus of claim 1, wherein the rotational actuator comprises a motor.

3. The apparatus of claim 2, wherein the motor is configured to rotate the sample well tray holder approximately ninety degrees.

4. The apparatus of claim 2, wherein the rotational actuator further comprises a shaft attached to the motor.

5. The apparatus of claim 4, wherein the motor comprises a stepper motor.

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6. The apparatus of claim 4, wherein the shaft attached to the motor is a spline shaft, the rotational actuator further comprising a spline bushing for engaging with the spline shaft so that the spline bushing is rotationally fixed but axially moveable relative to the spline shaft.

7. The apparatus of claim 6, wherein the spline bushing is rotationally fixed to the sample well tray holder.

8. The apparatus of claim 7, further comprising an extension arm for attaching the spline bushing to the sample well tray holder.

9. The apparatus of claim 1, wherein the plate of the sample well tray holder includes a recess for positioning the sample well tray therein.

10. The apparatus of claim 9, wherein the recess is defined by tapered side walls for receiving the sample well tray, the tapered side walls configured so that the sample well tray rests on the tapered side walls.

11. The apparatus of claim 10, wherein the recess is rectangular.

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12. The apparatus of claim 9, wherein the plate of the sample well tray holder includes a first portion having the recess and a second portion comprising an arm for connecting the first portion with the rotational actuator.

13. The apparatus of claim 1, wherein the biasing mechanism comprises a spring member.

14. The apparatus of claim 13, wherein the rotational actuator further comprises an output shaft that is rotatably fixed relative to the sample well tray holder, the spring member comprising a helical spring positioned around the first rotational axis and the output shaft.

15. The apparatus of claim 7, wherein the biasing mechanism comprises a helical spring positioned around the first rotational axis and surrounding a portion of the spline bushing.

16. The apparatus of claim 1, further comprising a robot configured to grasp a sample well tray and transport the sample well tray to the sample well tray holder.

17. The apparatus of claim 1, further comprising a heating device with an opening for the sample well tray to be placed therein.

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18. The apparatus of claim 1, further comprising a heating device for conducting thermal cycling.

19. The apparatus of claim 18, wherein the thermal cycling results in nucleic acid amplification.

20. The apparatus of claim 1, wherein the sample well tray comprises a 96-well microtiter tray.

21. The apparatus of claim 1, wherein the sample well tray comprises a 384-well microtiter tray.

22. The apparatus of claim 1, wherein wells of the sample well tray are conical.

23. The apparatus of claim 1, wherein wells of the sample well tray are sized to have a fluid volume in the range of 10 to 500μl.

24. A robotic manipulator for transporting sample well trays between at least two positions, comprising:

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a robotic arm having a sample well tray holder configured to support a sample well tray therein, the sample well tray holder comprising a recess for the sample well tray;

a rotational mechanism configured to impart rotational motion on the robotic arm, the rotational mechanism comprising a motor; and

a biasing mechanism configured to provide force on the sample well tray holder in a direction away from an adjacent sample block.

25. The robotic manipulator of claim 24, wherein the biasing mechanism comprises at least one helical spring positioned partially surrounding a shaft of the rotational mechanism.

26. The robotic manipulator of claim 25, further comprising a sleeve member positioned around the shaft of the rotational mechanism and partially surrounded by the helical spring, the sleeve member being rotationally fixed to the shaft of the rotational mechanism and axially slidable relative to the shaft, the biasing mechanism configured to urge the sleeve member in the direction away from the adjacent sample well block.

27. The robotic manipulator of claim 25, wherein the sleeve member comprises a spline bushing configured to engage a spline on the shaft of the rotational mechanism.

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28. The robotic manipulator of claim 26, further comprising a stop member positioned on the shaft of the rotational mechanism, the stop member configured to prevent the sleeve member from axially moving beyond a predetermined position on the shaft of the rotational mechanism.

29. A system for manipulating sample well trays, comprising:

a robot configured to transport a sample well tray to a first location;

a loading mechanism configured to take a sample well tray from the first location, place the sample well tray into a heating device at a second location and then later remove the sample well tray from the heating device and return the sample well tray to the first location, the loading mechanism comprising a sample well tray holder in which a sample well tray may be positioned therein, a rotational actuator configured to rotate the sample well tray holder, and a biasing member configured to urge the sample well tray and sample well tray holder in a direction away from a sample block; and

a heating device having an opening for receiving the sample well tray therein.

30. The system of claim 29, wherein the heating device is a heater and the rotational actuator comprises a motor for rotating a shaft and a spline bushing positioned in a rotationally fixed manner on the shaft.

31. A method of manipulating sample well trays, comprising:

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placing a sample well tray into a sample well tray holder of a first robot mechanism located at a first position;

rotating the sample well tray holder of the first robot mechanism about a rotational axis in a first rotational direction to insert the sample well tray holder into a heating device at a second position;

lowering the sample well tray holder in a direction toward a sample block of the heating device so that the sample well tray engages the sample block;

disengaging the sample well tray from the sample block so that the sample well tray does not directly contact the sample block;

lifting the sample well tray holder and sample well tray from the heating device by a biasing mechanism so that the sample well tray is capable of rotation away from the sample block and heating device without interference; and

rotating the sample well tray holder of the first robot mechanism in a second rotational direction toward the first position to remove the sample well tray holder from the heating device.

32. The method of claim 31, wherein the lowering of the sample well tray holder comprises engaging the sample well tray with a cover of the heating device in order to lower the sample well tray holder.

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33. The method of claim 31, further comprising, prior to placing the sample well tray in a sample well tray holder, the step of picking up a sample well tray with a second robot mechanism, and rotating the sample well tray to place the sample well tray in the first position.

34. The method of claim 31, wherein the biasing mechanism that lifts the sample well tray holder comprises a helical spring that urges the sample well tray away from the sample block.

35. The method of claim 31, wherein the step of disengaging the sample well tray from the sample block includes providing an upward force on the sample well tray holder by an urging mechanism positioned between the sample well tray holder and the sample block.

36. The method of claim 35, wherein the urging mechanism comprises at least one spring device.

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